CLAIMS

1. A deoxyribonuclease, which is an endonuclease capable of cleaving DNA independently from divalent cations under acidic conditions and characterized in that it has the following properties:

(1) active pH range: ca. 4.0 to ca. 7.6

(2) DNA cleavage mode: 3'-P/5'-OH end forming type

(3) sensitivity against inhibitors:

(i) inhibited by Zn^{2+}

(ii) not inhibited by G-actin.

2. The deoxyribonuclease of claim 1, characterized in that it further has the following properties:

(1) optimal pH: ca. 5.2

(2) molecular weight: ca. 55 kDa as a post-translational modification product (SDS-PAGE)

(3) localization: present in cytoplasm and extracellularly, rich in cytoplasm

(4) tissue specificity: specifically expressed in the liver

3. A deoxyribonuclease having the following polypeptide (a) or (b):

(a) a polypeptide consisting of an amino acid sequence of amino acid Nos. 1 to 332 of the amino acid sequence shown in Sequence Listing, SEQ ID NO: 1

(b) a polypeptide consisting of the same amino acid sequence of (a) above, except that one to several amino acids are deleted, substituted, inserted, added or modified, wherein a mature protein has an endonuclease activity capable of cleaving a DNA independently from divalent cations, in a pH range of from ca. 4.0 to ca. 7.6.

4. The deoxyribonuclease of any of claims 1 to 3, wherein a primary translation product contains an N terminal signal peptide sequence.

5. The deoxyribonuclease of claim 4, wherein said N terminal

signal peptide consists of an amino acid sequence of the amino acid Nos. -22 to -1 of the amino acid sequence shown in Sequence Listing, SEQ ID NO: 1.

6. The deoxyribonuclease of any of claims 1 to 5, which is derived from a mammal.

7. The deoxyribonuclease of claim 6, which is derived from a mouse.

8. A deoxyribonuclease comprising the following polypeptide (a) or (b):

(a) a polypeptide consisting of an amino acid sequence of the amino acid Nos. 1 to 334 of the amino acid sequence shown in Sequence Listing, SEQ ID NO: 3

(b) a polypeptide consisting of the same amino acid sequence of (a) above, except that one to several amino acids are deleted, substituted, inserted, added or modified, wherein a mature protein has an endonuclease activity capable of cleaving a DNA independently from divalent cations, in a pH range of from ca. 4.0 to ca. 7.6.

9. The deoxyribonuclease of claim 8, wherein a primary translation product comprises an N terminal signal peptide sequence.

10. The deoxyribonuclease of claim 9, wherein said N terminal signal peptide consists of an amino acid sequence of the amino acid Nos. -27 to -1 of the amino acid sequence shown in Sequence Listing, SEQ ID NO: 3.

11. The deoxyribonuclease of any of claims 8 to 10, which is derived from a mammal.

12. The deoxyribonuclease of any of claims 1, 2 and 11, which is derived from human.

13. A DNA encoding the deoxyribonuclease of any of claims 1 to 12.

14. A DNA consisting of the following nucleotide sequence (a) or

(b):

(a) a nucleotide sequence of the nucleotide Nos. 279 to 1274 of the nucleotide sequence shown in Sequence Listing, SEQ ID NO: 2

(b) a nucleotide sequence capable of being hybridized to the nucleotide sequence of (a) above under stringent conditions, which encodes a deoxyribonuclease having an endonuclease activity capable of cleaving DNA independently from divalent cations, in a pH range of from ca. 4.0 to ca. 7.6.

15. A DNA consisting of the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence of the nucleotide Nos. 213 to 1274 of the nucleotide sequence shown in Sequence Listing, SEQ ID NO: 2

(b) a nucleotide sequence capable of being hybridized to the nucleotide sequence of (a) above under stringent conditions, which encodes a primary translation product of a deoxyribonuclease whose mature protein has an endonuclease activity capable of cleaving DNA independently from divalent cations, in a pH range of from ca. 4.0 to ca. 7.6.

16. A DNA consisting of the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence of the nucleotide Nos. 82 to 1083 of the nucleotide sequence shown in Sequence Listing, SEQ ID NO: 4

(b) a nucleotide sequence capable of being hybridized to the nucleotide sequence of (a) above under stringent conditions, which encodes a deoxyribonuclease having an endonuclease activity capable of cleaving DNA independently from divalent cations, in a pH range of from ca. 4.0 to ca. 7.6.

17. A DNA consisting of the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence of the nucleotide Nos. 1 to 1083 of the nucleotide sequence shown in Sequence Listing, SEQ ID NO: 2

(b) a nucleotide sequence capable of being hybridized to the nucleotide sequence of (a) above under stringent conditions, which encodes a primary translation product of a deoxyribonuclease whose mature protein has an endonuclease activity capable of cleaving

DNA independently from divalent cations, in a pH range of from ca. 4.0 to ca. 7.6.

18. The DNA of any of claims 13 to 17, which is derived from a mammal.

19. The DNA of claim 14 or 15, which is derived from a mouse.

20. The DNA of claim 16 or 17, which is derived from a human.

21. A recombinant vector comprising the DNA of any of claims 13 to 20.

22. An expression vector comprising the DNA of any of claims 13 to 20 and a promoter operably linked to said DNA.

23. A transformant obtained by transforming a host cell with the expression vector of claim 22.

24. A method for producing the deoxyribonuclease of any of claims 1 to 12, which comprises culturing the transformant of claim 23 in a medium and recovering the deoxyribonuclease from a resulting culture.

25. A pharmaceutical composition comprising the deoxyribonuclease of any of claims 1 to 12 as an active ingredient.

26. A pharmaceutical composition comprising the expression vector of claim 22 as an active ingredient.

27. A pharmaceutical composition comprising the transformant of claim 23 as an active ingredient.

28. The pharmaceutical composition of any of claims 25 to 27, which is for the prophylaxis or treatment of infectious diseases.

29. The pharmaceutical composition of any of claims 25 to 27, which is for the treatment of cystic fibrosis.